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Seasonal dynamics of planktonic algae in the right bank of the Volga reach of the Kuibyshev Reservoir

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Abstract

The paper deals with the seasonal dynamics and spatial distribution patterns of planktonic algae in the right bank of the Kuibyshev reservoir (the Volga river) during growing season (June-September) of 2015. The Kuibyshev reservoir (Republic of Tatarstan, Russia), formed as a result of the river Volga stanching with a dam of the Volga hydroelectric station, has a pronounced coastal asymmetry. Along the right bank there stretches the Volga Upland and rocky Zhiguli Mountains. The left bank is mostly flat and low-lying. The large difference between the right and left banks causes the differing hydrological conditions along the reservoir, which affect the living conditions of aquatic organisms, and especially planktonic algae - phytoplankton. The total abundance and biomass of planktonic algae ranged 0.45-1584.21 mln.cells/l and 0.44-109.35 mg/l. The algae, quantitavely dominating in the phytoplankton, are those of phylum Cyanophyta,Chlorophyta,Dinophytaand class Bacillariophycea. In 2015, the level dynamics in the reservoir was high and stable, close to the normal headwater level - 53 m, resulting in quite short and not so intense phenomenon of "blooming" water as can be seen usually in the summer and summer-autumn period in Kuibyshev reservoir. During the study, the coefficients of Spierman correlation between the indices of phytoplankton, air temperature, water temperature and water level fluctuation were calculated, and some relations were found. A negative correlation ($r = -0.65$ at $p<0.05$) was observed between the quantitative indices of phytoplankton (the total abundance and biomass) and the water level. Together with the decline in water level an increase in the content of the blue-green algae was observed ($r = -0.7$ both for abundance and biomass at $p<0.05$). No significant correlations between water temperature, air temperature and the indicators of algal communities were observed. The results of this study will be used in the monitoring and forecasting research of the rivers of the Republic of Tatarstan.

Keywords

Algae, Blue-green algae, Kuibyshev reservoir, Phytoplankton, The Volga River, Water level